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SUGHRUE MION ZINN MACPEAK & SEAS, PLLC

David J. Cushing

T 202-663-7925

dcushing@sughrue.com

June 1, 2001

BOX PCT

Commissioner for Patents
Washington, D.C. 20231

PCT/PCT/AU99/01071
-filed December 6, 1999

www.sughrue.com

Re: Application of Graham BROAD, Noel MCDONALD, Charles WILLIAMS
WAVEGUIDE DIRECTIONAL FILTER
Assignee: ALCATEL
Our Ref: Q63519

Dear Sir:

The following documents and fees are submitted herewith in connection with the above application for the purpose of entering the National stage under 35 U.S.C. § 371 and in accordance with Chapter II of the Patent Cooperation Treaty:

- ☐ an executed Declaration and Power of Attorney.
- ☒ a copy of the International Application.
- ☒ 7 sheets of drawings.
- ☐ an English translation of Article 19 claim amendments.
- ☐ an English translation of Article 34 amendments (annexes to the IPER).
- ☐ an executed Assignment and PTO 1595 form.
- ☐ a Form PTO-1449 listing the ISR references, and a complete copy of each reference.
- ☒ a Preliminary Amendment

The Declaration and Power of Attorney, Assignment, Form PTO-1449 listing the International Search Report (ISR) references and a complete copy of each reference will be submitted at a later date.

It is assumed that copies of the International Application, the International Search Report, the International Preliminary Examination Report, and any Articles 19 and 34 amendments as required by § 371(c) will be supplied directly by the International Bureau, but if further copies are needed, the undersigned can easily provide them upon request.

Assignment for published patent application is: **ALCATEL**.

097/857104
JC18 Rec'd PCT/PTO 01 JUN 2001
2100 Pennsylvania Avenue, NW
Washington, DC 20037-3213

T 202.293.7060
F 202.293.7860

1010 El Camino Real
Menlo Park, CA 94025-4345

T 650.325.5800
F 650.325.6606

Toei Nishi Shimbashi Bldg. 4F
13-5 Nishi Shimbashi 1-Chome
Minato-Ku, Tokyo 105-0003
Japan

T 03.3503.3760
F 03.3503.3756



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**PLEASE SEE THE ATTACHED PRELIMINARY AMENDMENT BEFORE
CALCULATING THE FEE**

The Government filing fee is calculated as follows:


Total claims	<u>27</u>	-	20	=	<u>7</u>	x	\$18.00	=	\$126.00
Independent claims	<u>5</u>	-	3	=	<u>2</u>	x	\$80.00	=	\$160.00
Base Fee									\$1000.00

TOTAL FEE									<u>\$1286.00</u>
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A check for the statutory filing fee of \$1286.00 is attached. You are also directed and authorized to charge or credit any difference or overpayment to Deposit Account No. 19-4880. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.492 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

Priority is claimed from December 04, 1998 based on Australian Application No. PP7470.

Respectfully submitted,


David J. Cushing
Registration No. 28,703

SUGHRUE, MION, ZINN,
MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: June 1, 2001

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of PCT/AU99/01071
Graham BROAD, et al. Attorney Docket Q63519
Appln. No.: Group Art Unit:
Confirmation No.: Examiner:
Filed: June 01, 2001
For: WAVEGUIDE DIRECTIONAL FILTER

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please cancel claims 21 and 28.

Please enter the following amended claims:

9. (Amended)A waveguide directional filter arrangement as claimed in claim 2,
wherein said inwardly extending sections are approximately hemicycle-shaped planar sections.
12. (Amended)A waveguide directional filter arrangement as claimed in claim 2
wherein said inwardly extending sections are hemicycle-shaped portions of cylinders, whose
axes are normal to said aperture's major plane.

17. (Amended)A waveguide directional filter arrangement as claimed in claim 4, wherein the aspect ratio of said wall sections is approximately 4:1.

18. (Amended)A waveguide directional filter arrangement as claimed in claim 3, wherein at least one said resonator element includes a plurality of cooling fins operatively attached thereto.

19. (Amended)A waveguide directional filter arrangement as claimed in claim 3, wherein at least one said resonator element includes at least one tuning element means.

20. (Amended)A waveguide directional filter arrangement as claimed in claim 1, wherein said resonator element is symmetric.

27. (Amended)An adjustable aperture arrangement as claimed in claim 24, wherein the screw head includes a bayonet socket for cooperating with a tool having a T-shaped end.

29. (Amended)A waveguide directional filter arrangement comprising an input waveguide and an output waveguide connected by a resonator structure, wherein said input waveguide and said output waveguide each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1, and wherein said resonator structure comprises a housing having access holes, at least two cavity resonators coupled by an adjustable coupling aperture arrangement in a substantially planar wall common to both said resonators, said

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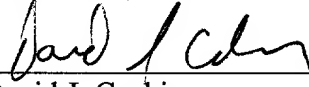
adjustable coupling aperture arrangement including at least one slit of predetermined dimensions, the at least one slit communicating with a respective access hole via an associated passageway that lies within the boundary of major surfaces of said planar wall, wherein said at least one slit is provided with a moveable metal slug that is slideably retained by opposite longitudinal edges of the slit, whereby said slug can be engaged and slideably manipulated by a tool, introduced into said access hole and guided to said slug via said passageway, into a position in which electrical contact between said slug and said edges of the slit produces a desired change in effective electrical length of the slit.

PRELIMINARY AMENDMENT
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REMARKS

Entry and consideration of this Amendment is respectfully requested.

Respectfully submitted,



David J. Cushing
Registration No. 28,703

SUGHRUE, MION, ZINN,
MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: June 1, 2001

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 21 and 28 are canceled.

The claims are amended as follows:

9. (Amended) A waveguide directional filter arrangement as claimed in ~~any one of~~
~~claims 2, 4 to 8~~claim 2, wherein said inwardly extending sections are approximately hemicycle-
shaped planar sections.

12. (Amended) A waveguide directional filter arrangement as claimed in ~~claims 2, 4 to~~
~~8, claim 2~~ wherein said inwardly extending sections are hemicycle-shaped portions of cylinders,
whose axes are normal to said aperture's major plane.

17. (Amended) A waveguide directional filter arrangement as claimed in ~~any one of~~
~~claims 4-16~~claim 4, wherein the aspect ratio of said wall sections is approximately 4:1.

18. (Amended) A waveguide directional filter arrangement as claimed in ~~any one of~~
~~claims 3 to 17~~claim 3, wherein at least one said resonator element includes a plurality of cooling
fins operatively attached thereto.

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19. (Amended) A waveguide directional filter arrangement as claimed in ~~any one of~~ claims 3 to 18 claim 3, wherein at least one said resonator element includes at least one tuning element means.

20. (Amended) A waveguide directional filter arrangement as claimed in ~~any one of~~ the preceding claims claim 1, wherein said resonator element is symmetric.

27. (Amended) An adjustable aperture arrangement as claimed in ~~any one of claims~~ 24, 25 or 26 claim 24, wherein the screw head includes a bayonet socket for cooperating with a tool having a T-shaped end.

29. (Amended) ~~An adjustable aperture arrangement as claimed in any one of claims 22 to 28, operatively incorporated in a waveguide directional filter arrangement as claimed in any one of claims 1 to 21~~ A waveguide directional filter arrangement comprising an input waveguide and an output waveguide connected by a resonator structure, wherein said input waveguide and said output waveguide each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1, and wherein said resonator structure comprises a housing having access holes, at least two cavity resonators coupled by an adjustable coupling aperture arrangement in a substantially planar wall common to both said resonators, said adjustable coupling aperture arrangement including at least one slit of predetermined dimensions, the at least one slit communicating with a respective access hole via an associated passageway that lies within the boundary of major surfaces of said planar wall, wherein said at least one slit is

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provided with a moveable metal slug that is slideably retained by opposite longitudinal edges of the slit, whereby said slug can be engaged and slideably manipulated by a tool, introduced into said access hole and guided to said slug via said passageway, into a position in which electrical contact between said slug and said edges of the slit produces a desired change in effective electrical length of the slit.

WAVEGUIDE DIRECTIONAL FILTERField of Invention

This invention relates to the technology of combining multiple UHF TV broadcasting transmitters on to a common antenna.

5 Background of Invention

In this technology it is known to provide a UHF filter/combiner system comprising an assembly of dual bandpass filters whose inputs and outputs are coupled by waveguide hybrid couplers. A disadvantage of this known system is its relatively large size. Another disadvantage of this system is that the dual bandpass filters must be electrically identical, which is difficult to accomplish due to their complexity.

It is also known to provide a UHF filter/combiner that comprises a cascade of dual mode resonant cavities with input and output coaxial coupling elements, such as the "ROTAMODE" device. However, a disadvantage of this form of construction is that the power handling capability of the coaxial input and output elements is limited.

It is also known to use a waveguide directional filter technique at microwave multi-point distribution system(MMDS) frequencies above 2GHz. Each TV channel at MMDS frequencies occupies a fractional bandwidth of much less than 1%. However, at UHF broadcasting frequencies in the range 470-860 MHz, the fractional bandwidth of a TV channel is of the order of 1% or more, and a conventional waveguide directional filter does not provide a satisfactory electrical performance.

Summary of the Invention

25 It is an object of the present invention to provide a waveguide directional filter arrangement which can be used at UHF broadcasting frequencies, and avoids the disadvantages of the aforementioned prior art.

According to a first aspect of the invention there is provided a waveguide directional filter arrangement comprising an input waveguide means and an output waveguide means connected by cavity resonator means, wherein said input waveguide means and said output waveguide means each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1.

According to a second aspect of the invention there is provided a waveguide directional filter arrangement comprising an input waveguide means and an output

5 waveguide means, wherein each said waveguide means includes an aperture means arranged to couple its associated waveguide means to a common resonator means, and wherein edges of each aperture means include inwardly extending sections.

According to a third aspect of the invention there is provided a waveguide directional filter arrangement comprising an input waveguide means and an output
10 waveguide means connected by cavity resonator means comprising at least three stacked resonator elements, wherein at least one pair of non-adjacent resonator elements include additional coupling means to couple the non-adjacent resonator elements.

According to a fourth aspect of the invention there is provided a waveguide
15 directional filter arrangement comprising an input waveguide means and an output waveguide means connected by a cavity resonator means comprising at least one resonator element, said input waveguide means and said output waveguide means each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1, each said waveguide means includes an aperture means
20 arranged to couple its associated waveguide means to said cavity resonator means, wherein edges of each aperture means include inwardly extending sections.

In highly selective bandpass filters which use adjacent cavity resonators coupled by apertures in common walls, the magnitudes of such couplings are very
25 critical parameters.

In order to achieve these necessary critical parameters it is known to provide a high degree of manufacturing precision. However, this solution is unattractive for large filters.

It is therefore a further object of the present invention to provide an
30 adjustable coupling aperture arrangement for adjusting the coupling of cavity resonators over a wide range of coupling values, the coupling being adjusted externally using a tool that does not disturb the filter's characteristics.

According to a fifth aspect of the invention, in a microwave filter comprising a housing within which is disposed at least two cavity resonators coupled by aperture means in a substantially planar wall common to both said resonators, there is provided an adjustable coupling aperture arrangement including aperture

means comprising at least one slit of predetermined dimensions, the at least one slit communicating with a respective access hole in said housing via an associated passageway that lies within the boundary of said wall's major surfaces, wherein said at least one slit is provided with a moveable metal slug that is slideably retained by opposite longitudinal edges of the slit, whereby said slug can be engaged and slideably manipulated by a tool means, introduced into said access hole and guided to said slug via said passageway, into a position in which electrical contact between said slug and said edges of the slit produces a desired change in effective electrical length of the slit.

Brief Description of the Drawings

In order that the invention may be readily carried into effect, embodiments thereof will now be described in relation to the accompanying drawings, in which:

Figure 1 shows a waveguide directional filter assembly of the present invention.

Figure 2 shows a more detailed view of the aperture arrangement of the assembly shown in Figure 1.

Figure 3 shows an alternative aperture arrangement.

Figure 4 shows a waveguide direction filter assembly with additional coupling between non-adjacent resonators.

Figure 5 is a top view of a cavity wall within a coaxial filter housing, the cavity wall being provided with an adjustable coupling iris.

Figure 6 is a top view of the cavity wall shown in Figure 5, showing radial passageways connecting slits of the coupling iris to the filter housing exterior.

Figure 7 is a side view of Figure 6.

Figure 8 is a top view of an expanded adjustment slug.

Figure 9 is a top view of a contracted adjustment slug.

Figure 10 is an end view of a adjustment slug.

Figure 11 is a side view of a cavity wall showing an adjustment slug located within a slit of the coupling iris.

Detailed Description

5 Referring to Figure 1, the assembly comprises an input waveguide 1 having a narrow band input port and an absorbing termination port; and an output waveguide 2 having a wideband input port and an output port. The waveguides are rectangular having broad walls 3 joined to narrow walls 4 whose aspect ratio is approximately 4:1.

10 Waveguides 1 and 2 are connected by six circularly cylindrical aperture coupled cavities 5. Coupling between adjacent cavities is provided by circular apertures 6.

Each end cavity is operatively coupled to its associated rectangular waveguide through a characteristically shaped aperture 7, 7a. Referring to Figure 15 2, aperture 7a, which is similar to aperture 7 in input waveguide 1, is in the form of a rectangle whose four sides have integral inwardly extending hemicycle sectors 8, 9, 10 and 11. These hemicycle sections provide increased coupling into the desired resonator mode.

It will be understood that the inwardly extending hemicycle sections can be 20 in the form of discrete elements, such as for example discs, that can be attached around the edges of a basic rectangular aperture. The position of such discrete elements can be made adjustable to vary the coupling through the aperture.

Alternatively, the inwardly extending hemicycle sections can be in the form of cylinders 12, 13, 14 and 15 as shown in Figure 3. As with the above mentioned 25 discs, the position of the cylinders can be adjustable to vary the coupling through the aperture. Moreover, the cylindrical form causes a greater reduction of coupling into undesirable modes.

Referring to Figure 4, non-adjacent resonator elements 16 and 17 of the waveguide directional filter assembly are provided with two additional coupling 30 elements 19 and 20. Each coupling element comprises two probes 21 and 22 connected by a transmission line 23. The probes extend into the resonators and are disposed at 90° to one another.

The power handling capability of the waveguide directional filter arrangement described above can be enhanced by the addition of cooling fins (not shown) on one or more of the cavity resonators.

5 Also, tuning elements (not shown) can be added to the cavity resonators.

In operation, a narrow band signal is injected into the input port of input waveguide 1. This signal is coupled through aperture 7 into the first cavity resonator and launches a circularly polarised wave therein which is coupled through successive circularly cylindrical resonators 5 by means of circular
10 apertures 6 to the output waveguide 2 via aperture 7a, where it produces a directional wave. This signal is added to any existing signals travelling through the same waveguide at other frequencies.

An absorbing termination coupled to waveguide 1 absorbs any power not coupled into the first resonator.

15 The reduced height of the waveguides improves the circularity of the circularly polarised wave in the resonators, which provides improved directional characteristics in the output waveguide across the operational band.

An advantage of the waveguide directional filter assembly of the present invention vis-a-vis the prior art assembly using separate hybrids and filters is that
20 the assembly of the present invention is relatively unaffected by temperature differentials which can occur between separate filters in a hybrid coupled configuration. Such temperature differentials lead to a degradation of performance.

Referring to Figures 5 and 6, the adjustable coupling aperture arrangement comprises an electrically conductive wall 24 coaxially located within a filter housing
25 25. Wall 24 is provided with a cruciform iris 26 comprising a central zone 27 having four slits 28, 29, 30 and 31 extending outwardly therefrom. Each slit is connected by a radial passageway 32, 33, 34 and 35 to respective apertures 25a, 25b, 25c and 25d in the filter housing permitting access to the slits from the exterior of the filter housing. The passageways are within the boundary of the wall's opposite
30 surfaces. In each slit is arranged a captive, movable, rectangular metal slug 36, 37, 38 and 39.

Referring to Figures 8 – 11, each rectangular slug comprises two sections A and B each in the form of general trapezoids whose respective non-parallel sides

40 and 41 interface. The two sections are held together by a screw 42. One section, A, is provided with a threaded hole (not shown), which cooperates with the screw's

thread when the screw is disposed in a bore hole in section B. The screw is provided with a slotted bayonet head 43 which allows the screw to be engaged by a tool (not shown) having a T-shaped end to allow the screw to be rotated as well as allowing the associated slug to be moved linearly.

A groove 44, 45 is provided in a side of each section A and B such that when a slug is assembled by screwing the sections together, opposite parallel grooves are formed for slidably engaging the edges of respective slits. Due to cooperation between sections A and B, the width between the sides provided with the grooves is maximum when the screw is tightened as shown in Fig. 8, and minimum when the screw is loosened as shown in Fig. 9. Referring to Fig. 11, the width is such that the slug is slidably retained in a slit when the screw is loosened, and fixedly grips and makes electrical contact with opposite edges of the slit when the screw is tightened, thereby affecting the electrical length of the slit.

In operation, slugs 36, 37, 38 and 39 are located in respective slits. Desired filter transmission and reflection characteristics are obtained, using a vector network analyser and manipulating the slugs with the tool inserted into respective passageways 32, 33, 34 and 35 via associated apertures 25a, 25b, 25c and 25d. While it is preferable to use four slugs to maintain symmetry in two principal planes, it will be understood that this is not an essential requirement.

Further, in filter arrangements where only a single slit is required, either one or two slugs could be used.

The claims defining the invention are as follows:

1. A waveguide directional filter arrangement comprising input waveguide means and an output waveguide means connected by cavity resonator means, wherein said input waveguide means and said output waveguide means each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1.
2. A waveguide directional filter arrangement comprising an input waveguide means and an output waveguide means, wherein each said waveguide means includes an aperture means arranged to couple its associated waveguide means to a common resonator means, and wherein edges of each aperture means include inwardly extending sections.
3. A waveguide directional filter arrangement comprising an input waveguide means and an output waveguide means connected by cavity resonator means comprising at least three stacked resonator elements, wherein at least one pair of non-adjacent resonator elements include additional coupling means to couple the non-adjacent resonator elements.
4. A waveguide directional filter arrangement comprising input waveguide means and output waveguide means connected by cavity resonator means comprising at least one resonator element, said input waveguide means and said output waveguide means each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1, each said waveguide means includes an aperture means arranged to couple its associated waveguide means to said cavity resonator means, wherein edges of each aperture means include inwardly extending sections.
5. A waveguide directional filter arrangement as claimed in claim 4, comprising at least 3 stacked resonator elements, at least one pair of non-adjacent resonator elements including additional coupling means to couple the non-adjacent resonator elements.
6. A waveguide directional filter arrangement as claimed in claim 5, wherein the additional coupling means comprises a first pair of coupling elements each of which

extend into a respective non-adjacent resonator element, said coupling elements being connected together by a first external transmission line means.

7. A waveguide directional filter arrangement as claimed in claim 6, including a second pair of coupling elements each of which extend into a respective non-adjacent resonator element, said coupling elements of said second pair of coupling elements being connected together by a second external transmission line means, said first pair of coupling elements and said second pair of coupling elements being disposed in a pre-determined spaced relationship.

8. A waveguide directional filter arrangement as claimed in claim 7, wherein said first pair of coupling elements and said second pair of coupling elements are disposed at approximately 90° to each other.

9. A waveguide directional filter arrangement as claimed in any one of claims 2, 4 to 8, wherein said inwardly extending sections are approximately hemicycle-shaped planar sections.

10. A waveguide directional filter arrangement as claimed in claim 9, wherein said hemicycle-shaped planar sections are integral with said aperture means.

11. A waveguide directional filter arrangement as claimed in claim 9, wherein said hemicycle-shaped planar sections are in the form of discrete members attached proximate said edges of said aperture means.

12. A waveguide directional filter arrangement as claimed in claims 2, 4 to 8, wherein said inwardly extending sections are hemicycle-shaped portions of cylinders, whose axes are normal to said aperture's major plane.

13. A waveguide directional filter arrangement as claimed in claim 12, wherein said cylinders are integral with said aperture means.

14. A waveguide directional filter arrangement as claimed in claim 12, wherein said cylinders are in the form of discrete members attached proximate said edges of said aperture means.

15. A waveguide directional filter arrangement as claimed in claim 11, wherein said discrete members include adjustment means for positional adjustment thereof.

16. A waveguide directional filter arrangement as claimed in claim 14, wherein said discrete cylinders include adjustment means for positional adjustment thereof.

17. A waveguide directional filter arrangement as claimed in any one of claims 4-16, wherein the aspect ratio of said wall sections is approximately 4:1.

18. A waveguide directional filter arrangement as claimed in any one of claims 3 to 17, wherein at least one said resonator element includes a plurality of cooling
5 fins operatively attached thereto.

19. A waveguide directional filter arrangement as claimed in any one of claims 3 to 18, wherein at least one said resonator element includes at least one tuning element means.

20. A waveguide directional filter arrangement as claimed in any one of the
10 preceding claims, wherein said resonator element is symmetric.

21. A waveguide directional filter arrangement, substantially as herein described with reference to Figures 1-4 of the accompanying drawings.

22. In a microwave filter comprising a housing within which is disposed at least two cavity resonators coupled by aperture means in a substantially planar wall
15 common to both said resonators, an adjustable coupling aperture arrangement including aperture means comprising at least one slit of predetermined dimensions, the at least one slit communicating with a respective access hole in said housing via an associated passageway that lies within the boundary of said wall's major surfaces, wherein said at least one slit is provided with a moveable
20 metal slug that is slideably retained by opposite longitudinal edges of the slit, whereby said slug can be engaged and slideably manipulated by a tool means, introduced into said access hole and guided to said slug via said passageway, into a position in which electrical contact between said slug and said edges of the slit produces a desired change in effective electrical length of the slit.

23. An adjustable aperture arrangement as claimed in claim 22, wherein said slug
25 includes a screw operated locking means arranged to be actuated by said tool means for locking said slug in said position.

24. An adjustable aperture arrangement as claimed in claim 23, wherein said slug
30 is a rectangular-shaped block having a groove in each of two opposite parallel sides for cooperating with opposite edges of said slit for slideably retaining and gripping said block therein, said block being formed from a first trapezoid-shaped section

and a second trapezoid-shaped section assembled together, with each section's non-parallel side interfacing, by a screw having a head and a threaded section, said screw's threaded section freely passing through a hole in the first trapezoid section to cooperate with a threaded hole provided in the second trapezoid-shaped section, whereby the width between said grooves can be varied by a turning adjustment of said screw with said tool means engaging the screw's head to change the positional relationship between the said interfacing non-parallel sides to cause the slug to be either slideably retained within the slit for manipulation, or fixedly locked in electrical contact with said edges of said slit.

25. An adjustable aperture arrangement as claimed in claim 24, wherein said aperture means comprises four slits of predetermined dimensions, extending outwardly from a central zone, each slit including a said slug, and each slit communicating with a respective said access hole via an associated said passageway.

26. An adjustable aperture arrangement as claimed in claim 25, wherein said planar wall is substantially circular in shape.

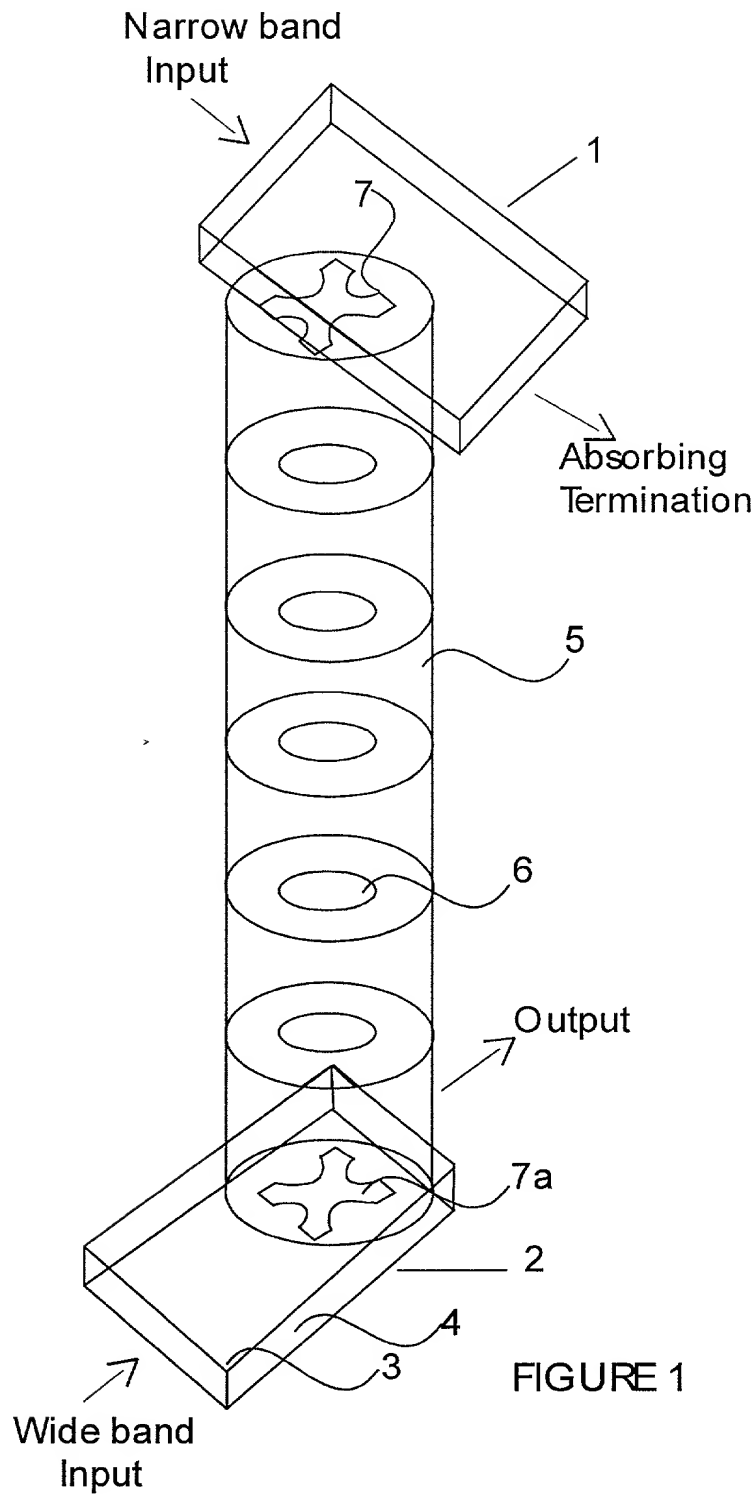
27. An adjustable aperture arrangement as claimed in any one of claims 24, 25 or 26, wherein the screw head includes a bayonet socket for cooperating with a tool having a T-shaped end.

28. An adjustable aperture arrangement substantially as herein described with reference to Figs. 5 – 11 of the accompanying drawings.

29. An adjustable aperture arrangement as claimed in any one of claims 22 to 28, operatively incorporated in a waveguide directional filter arrangement as claimed in any one of claims 1 to 21.

DATED THIS TWENTY THIRD DAY OF NOVEMBER 1999
ALCATEL

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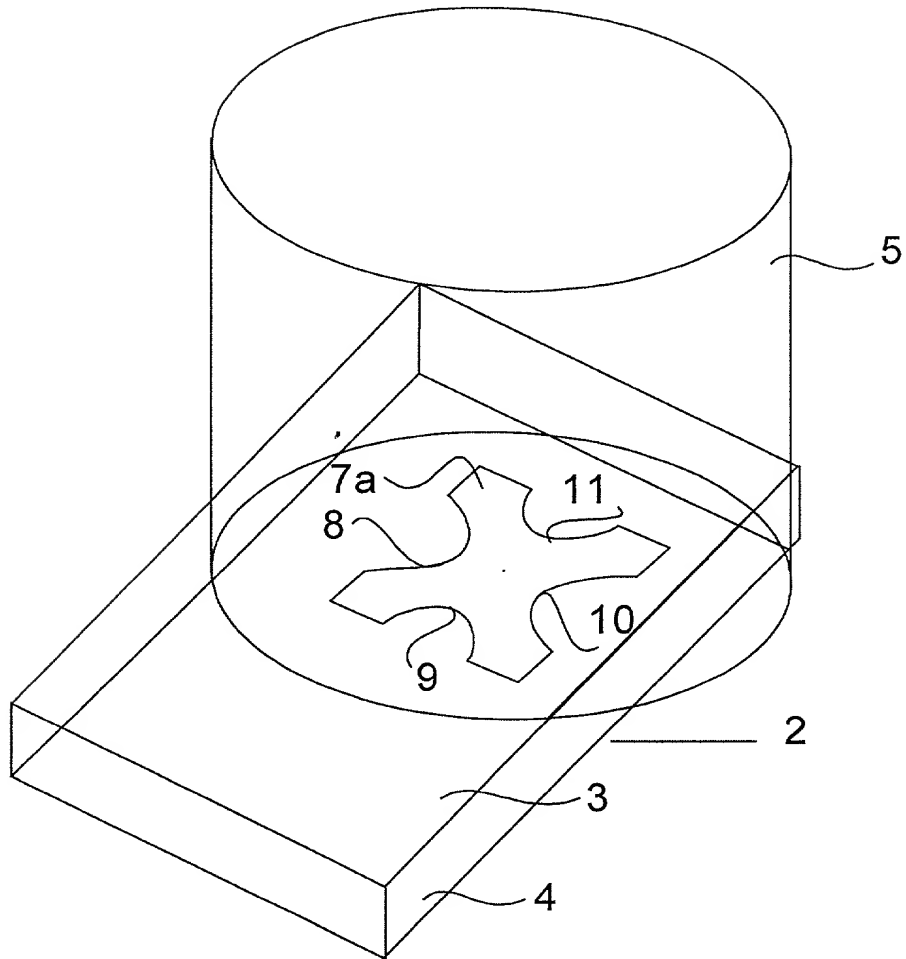


FIGURE 2

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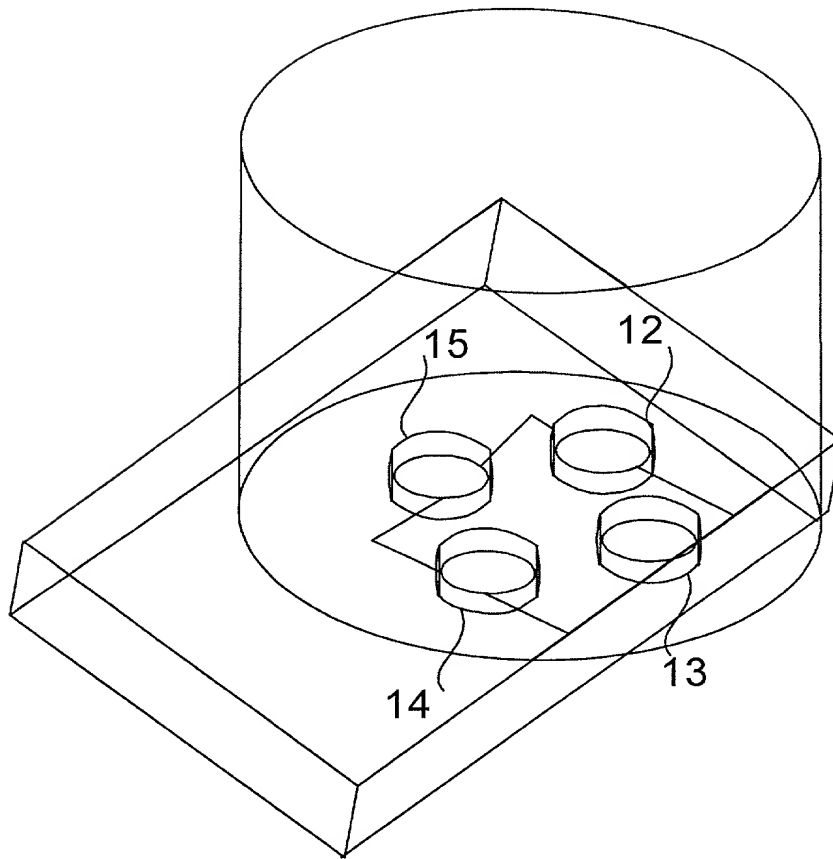
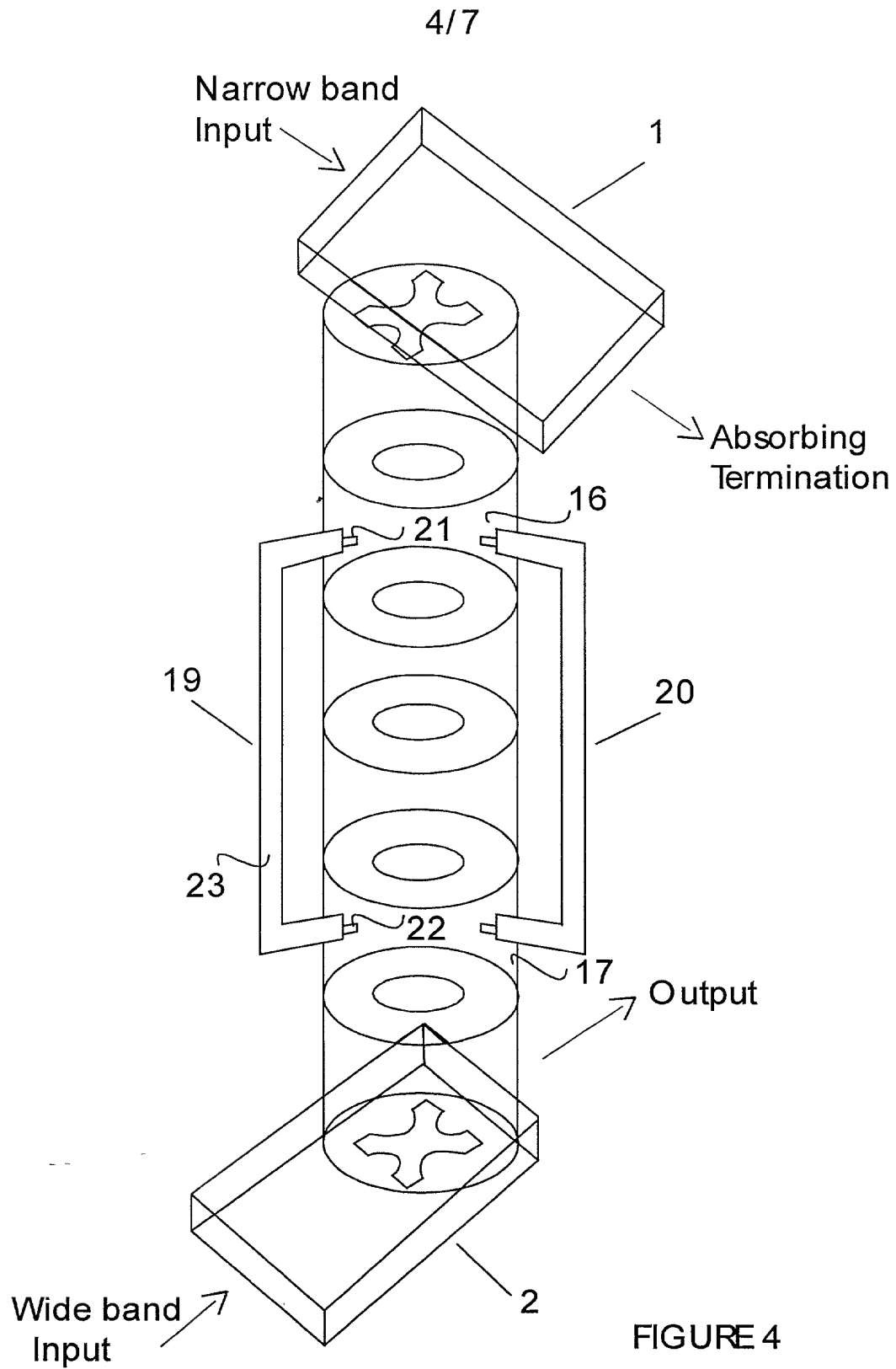
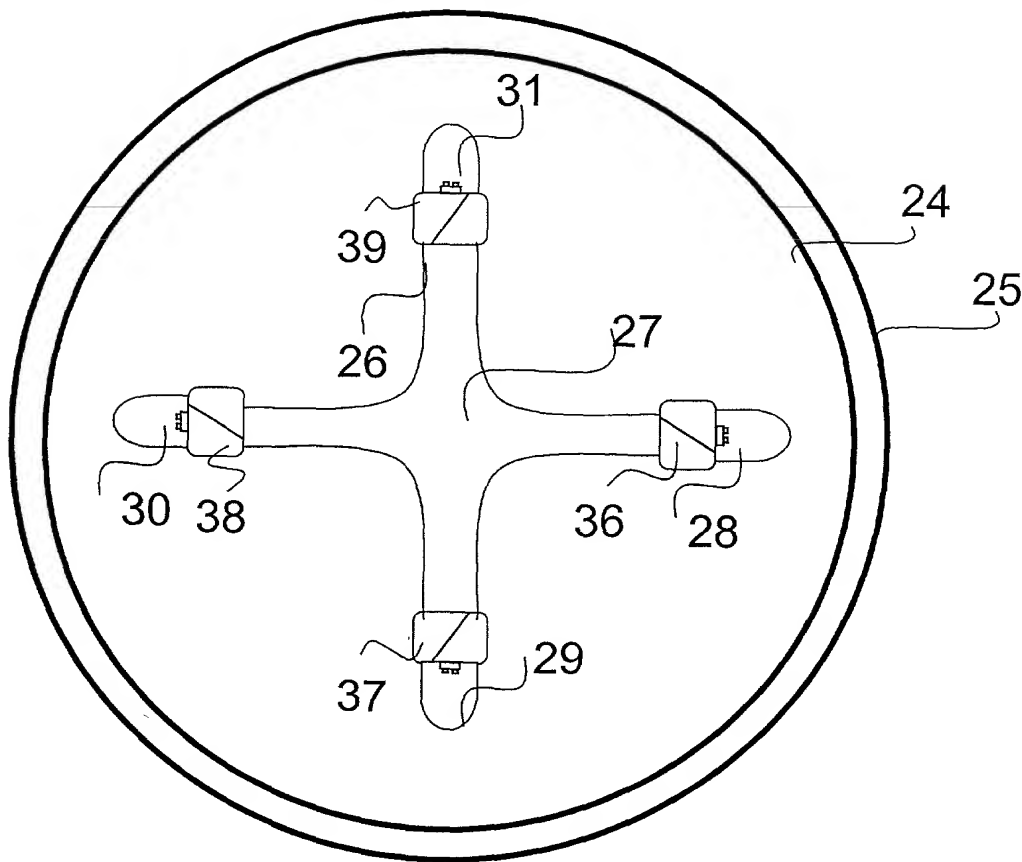


FIGURE 3



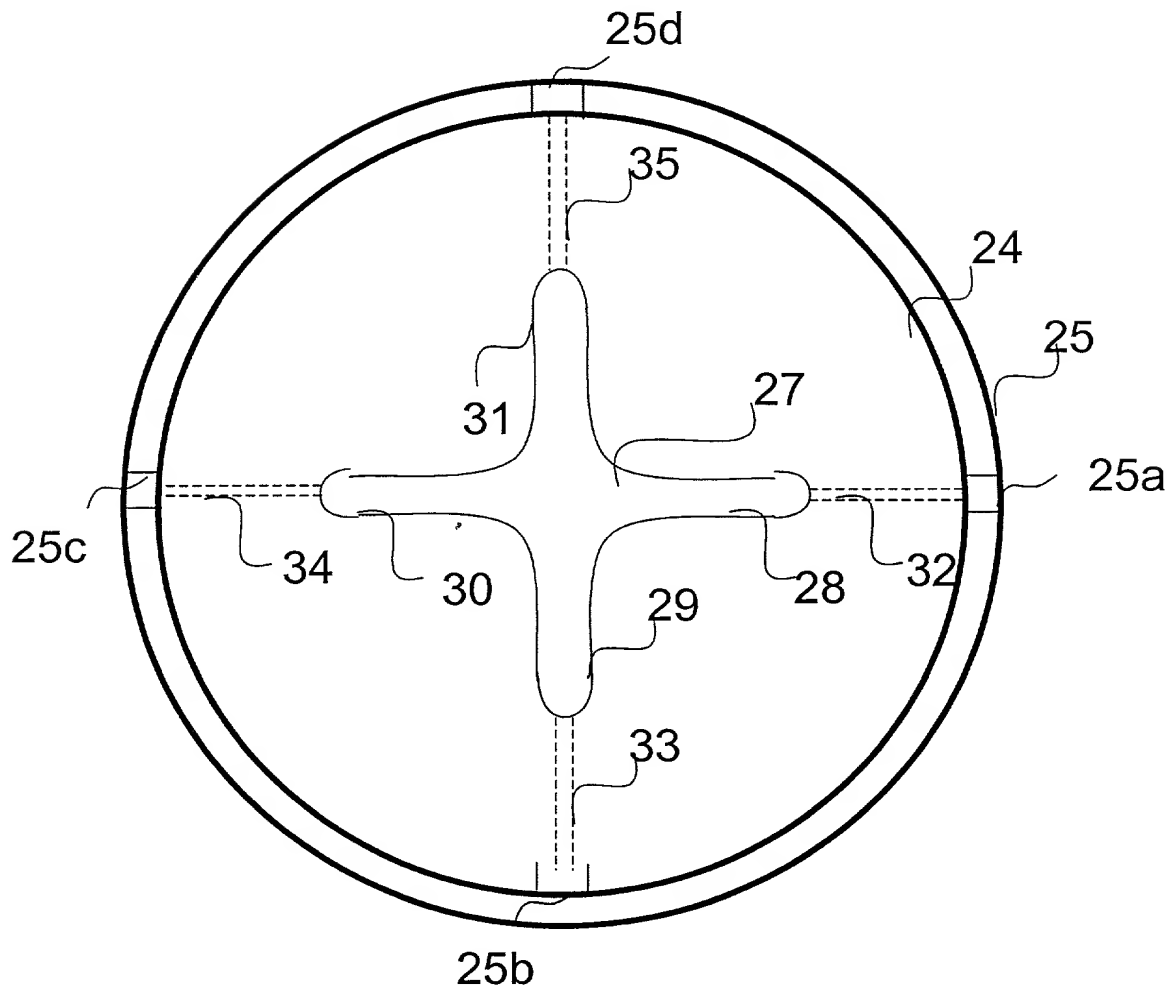
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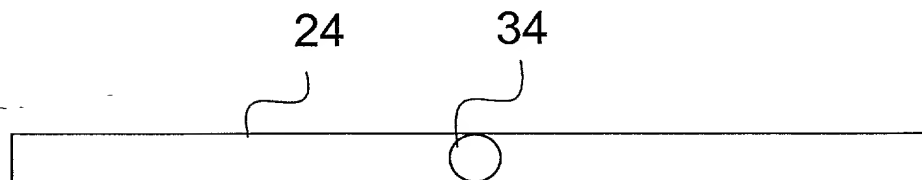
FIGURE

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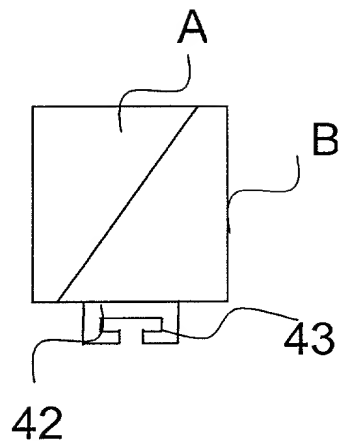


FIGURE

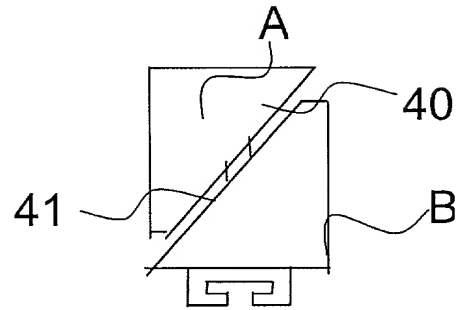


FIGURE

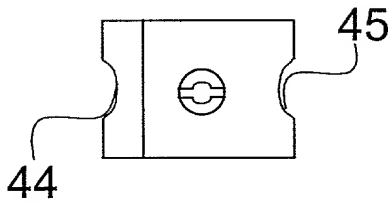
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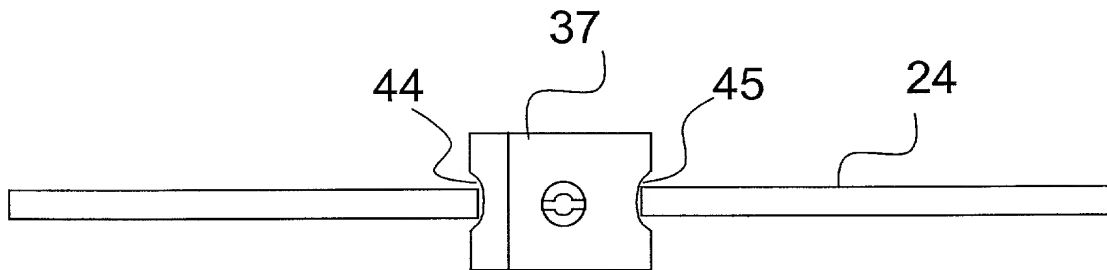
FIGURE



FIGURE



FIGURE



FIGURE

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name: that I verily believe I am an original, first and joint inventor, together with the other inventors listed below, of the subject matter claimed and for which a patent is sought in the application entitled:

WAVEGUIDE DIRECTIONAL FILTER

which application is:

☐ the attached application☒ Application Serial No: 09/857104

(for original application)

filed June 1, 2001, and amended on
June 1, 2001,

(for declaration not accompanying application)

that I have reviewed and understand the contents of the specification of the above-identified application, including the claims, as amended by any amendment referred to above; that I acknowledge my duty to disclose information of which I am aware which is material to the patentability of this application under 37 C.F.R. 1.56, that I hereby claim priority benefits under Title 35, United States Code §119, §172 or §365 of any provisional application or foreign application(s) for patent or inventor's certificate listed below and have also identified on said list any foreign application for patent or inventor's certificate on this invention having a filing date before that of any foreign application on which priority is claimed:

Application Number
PP7470**Country**
Australia**Filing Date**
December 04, 1998**Priority Claimed**
Yes

I hereby claim the benefit of Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in a listed prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge my duty to disclose any information material to the patentability of this application under 37 C.F.R. 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.**Filing Date****Status**

29-10 I hereby appoint John H. Mion, Reg. No. 18,879; Thomas J. Macpeak, Reg. No. 19,292; Robert J. Seas, Jr., Reg. No. 21,092; Darryl Mexic, Reg. No. 23,063; Robert V. Sloan, Reg. No. 22,775; Peter D. Olexy, Reg. No. 24,513; J. Frank Osha, Reg. No. 24,625; Waddell A. Biggart, Reg. No. 24,861; Louis Gubinsky, Reg. No. 24,835; Neil B. Siegel, Reg. No. 25,200; David J. Cushing, Reg. No. 25,703; John R. Inge, Reg. No. 26,916; Joseph J. Ruch, Jr., Reg. No. 26,577; Sheldon I. Landsman, Reg. No. 25,430; Richard C. Turner, Reg. No. 29,710; Howard L. Bernstein, Reg. No. 25,665; Alan J. Kasper, Reg. No. 25,426; Kenneth J. Burchfiel, Reg. No. 31,333; Gordon Kit, Reg. No. 30,764; Susan J. Mack, Reg. No. 30,951; Frank L. Bernstein, Reg. No. 31,484; Mark Boland, Reg. No. 32,197; William H. Mandir, Reg. No. 32,156; Brian W. Hannon, Reg. No. 32,778; Abraham J. Rosner, Reg. No. 33,276; Bruce E. ramer, Reg. No. 33,725; Paul F. Neils, Reg. No. 33,102; Brett S. Sylvester, Reg. No. 32,765; and Robert M. Masters, Reg. No. 35,603, my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and request that all correspondence about the application be addressed to **SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC**, 2100 Pennsylvania Avenue, N.W., Washington, D.C. 20037-3213.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date 18 JUNE 2001

First Inventor

GrahamJ.BROAD

First Name

Middle Initial

Last Name

Residence Lilydale Victoria/ AUSTRALIA
City State/Country

Signature

Post Office Address: 11, The Midway, Lilydale, Victoria 3140, AustraliaCitizenship Australian

Date 12 JUNE 2001 Second Inventor Noel A. McDONALD

Residence Croydon, Victoria/AUSTRALIA Signature [Signature]
City State/Country First Name Middle Initial Last Name

Post Office Address: 6, Narool Court, Croydon, Victoria 3136, AUSTRALIA AUX

Citizenship New Zealand

Date 12 JUNE 2001 Third Inventor Charles WILLIAMS

Residence Ferntree Gully Victoria/AUSTRALIA Signature [Signature]
City State/Country First Name Middle Initial Last Name

Post Office Address: 47, Dairy Lane, Ferntree Gully, Victoria 3156, AUSTRALIA

Citizenship Australian